

## Environmental Protection Agency

## § 1065.303

(d) *Balance configuration.* Configure the balance for optimum settling time and stability at your location.

[73 FR 37300, June 30, 2008, as amended at 75 FR 68462, Nov. 8, 2010]

### § 1065.295 PM inertial balance for field-testing analysis.

(a) *Application.* You may use an inertial balance to quantify net PM on a sample medium for field testing.

(b) *Component requirements.* We recommend that you use a balance that meets the specifications in Table 1 of § 1065.205. Note that your balance-based system must meet the linearity verification in § 1065.307. If the balance uses an internal calibration process for routine spanning and linearity verifications, the process must be NIST-traceable.

(c) *Loss correction.* You may use PM loss corrections to account for PM loss in the inertial balance, including the sample handling system.

(d) *Deposition.* You may use electrostatic deposition to collect PM as long as its collection efficiency is at least 95%.

[73 FR 59259, Oct. 8, 2008, as amended at 75 FR 68462, Nov. 8, 2010; 76 FR 57443, Sept. 15, 2011; 79 FR 23762, Apr. 28, 2014]

## Subpart D—Calibrations and Verifications

### § 1065.301 Overview and general provisions.

(a) This subpart describes required and recommended calibrations and

verifications of measurement systems. See subpart C of this part for specifications that apply to individual instruments.

(b) You must generally use complete measurement systems when performing calibrations or verifications in this subpart. For example, this would generally involve evaluating instruments based on values recorded with the complete system you use for recording test data, including analog-to-digital converters. For some calibrations and verifications, we may specify that you disconnect part of the measurement system to introduce a simulated signal.

(c) If we do not specify a calibration or verification for a portion of a measurement system, calibrate that portion of your system and verify its performance at a frequency consistent with any recommendations from the measurement-system manufacturer, consistent with good engineering judgment.

(d) Use NIST-traceable standards to the tolerances we specify for calibrations and verifications. Where we specify the need to use NIST-traceable standards, you may alternatively ask for our approval to use international standards that are not NIST-traceable.

### § 1065.303 Summary of required calibration and verifications.

The following table summarizes the required and recommended calibrations and verifications described in this subpart and indicates when these have to be performed:

TABLE 1 OF § 1065.303—SUMMARY OF REQUIRED CALIBRATION AND VERIFICATIONS

Type of calibration or verification	Minimum frequency <sup>1</sup>
§ 1065.305: Accuracy, repeatability and noise .....	Accuracy: Not required, but recommended for initial installation. Repeatability: Not required, but recommended for initial installation. Noise: Not required, but recommended for initial installation.

TABLE 1 OF § 1065.303—SUMMARY OF REQUIRED CALIBRATION AND VERIFICATIONS—Continued

Type of calibration or verification	Minimum frequency <sup>1</sup>
§ 1065.307: Linearity verification .....	Speed: Upon initial installation, within 370 days before testing and after major maintenance. Torque: Upon initial installation, within 370 days before testing and after major maintenance. Electrical power, current, and voltage: Upon initial installation, within 370 days before testing and after major maintenance. <sup>2</sup> Fuel flow rate: Upon initial installation, within 370 days before testing, and after major maintenance. Intake-air, dilution air, diluted exhaust, and batch sampler flow rates: Upon initial installation, within 370 days before testing and after major maintenance, unless flow is verified by propane check or by carbon or oxygen balance. Raw exhaust flow rate: Upon initial installation, within 185 days before testing and after major maintenance, unless flow is verified by propane check or by carbon or oxygen balance. Gas dividers: Upon initial installation, within 370 days before testing, and after major maintenance. Gas analyzers (unless otherwise noted): Upon initial installation, within 35 days before testing and after major maintenance. FTIR and photoacoustic analyzers: Upon initial installation, within 370 days before testing and after major maintenance. GC-ECD: Upon initial installation and after major maintenance. PM balance: Upon initial installation, within 370 days before testing and after major maintenance. Pressure, temperature, and dewpoint: Upon initial installation, within 370 days before testing and after major maintenance. Upon initial installation or after system modification that would affect response.
§ 1065.308: Continuous gas analyzer system response and updating-recording verification—for gas analyzers not continuously compensated for other gas species.	Upon initial installation or after system modification that would affect response.
§ 1065.309: Continuous gas analyzer system-response and updating-recording verification—for gas analyzers continuously compensated for other gas species.	Upon initial installation or after system modification that would affect response.
§ 1065.310: Torque .....	Upon initial installation and after major maintenance.
§ 1065.315: Pressure, temperature, dewpoint .....	Upon initial installation and after major maintenance.
§ 1065.320: Fuel flow .....	Upon initial installation and after major maintenance.
§ 1065.325: Intake flow .....	Upon initial installation and after major maintenance.
§ 1065.330: Exhaust flow .....	Upon initial installation and after major maintenance.
§ 1065.340: Diluted exhaust flow (CVS) .....	Upon initial installation and after major maintenance.
§ 1065.341: CVS and batch sampler verification <sup>3</sup> .....	Upon initial installation, within 35 days before testing, and after major maintenance.
§ 1065.342: Sample dryer verification .....	For thermal chillers: upon installation and after major maintenance. For osmotic membranes: upon installation, within 35 days of testing, and after major maintenance.
§ 1065.345: Vacuum leak .....	For laboratory testing: upon initial installation of the sampling system, within 8 hours before the start of the first test interval of each duty-cycle sequence, and after maintenance such as pre-filter changes. For field testing: after each installation of the sampling system on the vehicle, prior to the start of the field test, and after maintenance such as pre-filter changes.
§ 1065.350: CO <sub>2</sub> NDIR H <sub>2</sub> O interference .....	Upon initial installation and after major maintenance.
§ 1065.355: CO NDIR CO <sub>2</sub> and H <sub>2</sub> O interference .....	Upon initial installation and after major maintenance.
§ 1065.360: FID calibration .....	Calibrate all FID analyzers: upon initial installation and after major maintenance.
THC FID optimization, and THC FID verification .....	Optimize and determine CH <sub>4</sub> response for THC FID analyzers: upon initial installation and after major maintenance. Verify CH <sub>4</sub> response for THC FID analyzers: upon initial installation, within 185 days before testing, and after major maintenance.
§ 1065.362: Raw exhaust FID O <sub>2</sub> interference .....	For all FID analyzers: upon initial installation, and after major maintenance. For THC FID analyzers: upon initial installation, after major maintenance, and after FID optimization according to § 1065.360.
§ 1065.365: Nonmethane cutter penetration .....	Upon initial installation, within 185 days before testing, and after major maintenance.
§ 1065.369: H <sub>2</sub> O, CO, and CO <sub>2</sub> interference verification for ethanol photoacoustic analyzers.	Upon initial installation and after major maintenance.
§ 1065.370: CLD CO <sub>2</sub> and H <sub>2</sub> O quench .....	Upon initial installation and after major maintenance.
§ 1065.372: NDUV HC and H <sub>2</sub> O interference .....	Upon initial installation and after major maintenance.
§ 1065.375: N <sub>2</sub> O analyzer interference .....	Upon initial installation and after major maintenance.
§ 1065.376: Chiller NO <sub>2</sub> penetration .....	Upon initial installation and after major maintenance.

TABLE 1 OF § 1065.303—SUMMARY OF REQUIRED CALIBRATION AND VERIFICATIONS—Continued

Type of calibration or verification	Minimum frequency <sup>1</sup>
§ 1065.378: NO <sub>2</sub> -to-NO converter conversion .....	Upon initial installation, within 35 days before testing, and after major maintenance.
§ 1065.390: PM balance and weighing .....	Independent verification: upon initial installation, within 370 days before testing, and after major maintenance. Zero, span, and reference sample verifications: within 12 hours of weighing, and after major maintenance.
§ 1065.395: Inertial PM balance and weighing .....	Independent verification: upon initial installation, within 370 days before testing, and after major maintenance. Other verifications: upon initial installation and after major maintenance.

<sup>1</sup> Perform calibrations and verifications more frequently than we specify, according to measurement system manufacturer instructions and good engineering judgment.

<sup>2</sup> Perform linearity verification either for electrical power or for current and voltage.

<sup>3</sup> The CVS verification described in § 1065.341 is not required for systems that agree within  $\pm 2\%$  based on a chemical balance of carbon or oxygen of the intake air, fuel, and diluted exhaust.

[79 FR 23762, Apr. 28, 2014]

#### § 1065.305 Verifications for accuracy, repeatability, and noise.

(a) This section describes how to determine the accuracy, repeatability, and noise of an instrument. Table 1 of § 1065.205 specifies recommended values for individual instruments.

(b) We do not require you to verify instrument accuracy, repeatability, or noise.

However, it may be useful to consider these verifications to define a specification for a new instrument, to verify the performance of a new instrument upon delivery, or to troubleshoot an existing instrument.

(c) In this section we use the letter “y” to denote a generic measured quantity, the superscript over-bar to denote an arithmetic mean (such as  $\bar{y}$ ), and the subscript “<sub>ref</sub>” to denote the reference quantity being measured.

(d) Conduct these verifications as follows:

(1) Prepare an instrument so it operates at its specified temperatures, pressures, and flows. Perform any instrument linearization or calibration procedures prescribed by the instrument manufacturer.

(2) Zero the instrument as you would before an emission test by introducing a zero signal. Depending on the instrument, this may be a zero-concentration gas, a reference signal, a set of reference thermodynamic conditions, or some combination of these. For gas analyzers, use a zero gas that meets the specifications of § 1065.750.

(3) Span the instrument as you would before an emission test by introducing

a span signal. Depending on the instrument, this may be a span-concentration gas, a reference signal, a set of reference thermodynamic conditions, or some combination of these. For gas analyzers, use a span gas that meets the specifications of § 1065.750.

(4) Use the instrument to quantify a NIST-traceable reference quantity,  $y_{ref}$ . For gas analyzers the reference gas must meet the specifications of § 1065.750. Select a reference quantity near the mean value expected during testing. For all gas analyzers, use a quantity near the flow-weighted mean concentration expected at the standard or expected during testing, whichever is greater. For noise verification, use the same zero gas from paragraph (d)(2) of this section as the reference quantity. In all cases, allow time for the instrument to stabilize while it measures the reference quantity. Stabilization time may include time to purge an instrument and time to account for its response.

(5) Sample and record values for 30 seconds (you may select a longer sampling period if the recording update frequency is less than 0.5 Hz), record the arithmetic mean,  $\bar{y}_i$  and record the standard deviation,  $\sigma_i$  of the recorded values. Refer to § 1065.602 for an example of calculating arithmetic mean and standard deviation.

(6) Also, if the reference quantity is not absolutely constant, which might be the case with a reference flow, sample and record values of  $y_{ref}$  for 30 seconds and record the arithmetic mean of the values,  $\bar{y}_{ref}$ . Refer to § 1065.602 for an